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NEW BOOKS

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Geochemistry

APPLIED ENVIRONMENTAL GEOCHEMISTRY. Edited by Iain Thornton. 1983. Academic Press Inc., 111 Fifth Avenue, New York, NY 10003. 501 p. $70.00, hard cover.

Geochemistry is concerned with understanding how the elements and their isotopes are distributed in the atmosphere, water, and the solid parts of the Earth. Throughout history, modification of the Earth's surface, with resultant rapid alteration of the natural distribution of elements, has been a hallmark of human activity. With the spread of industrialization and a growing population's increased demand on resources, human impact on the environment intensified. At the same time, research has led to increased appreciation of the many and often subtle ways that biogeochemical cycles impact humans. Environmental geochemistry has evolved as the study of complex chemical interactions in the biosphere. It has broad interdisciplinary ties to soil science, agriculture, hydrology, geomedicine, and exploration geology.

Twenty-one authors from the U.S., U.K., Wales, West Germany, and Norway contributed sixteen chapters to this book on the principles, scope, and applications of environmental geochemistry. The book is directed towards informed readers and specialists; nearly all chapters assume basic knowledge of geology and chemistry. An elementary overview of the fundamentals of the subject is offered in the first chapter, with discussions of the primary distribution of elements in rocks, redistribution of elements by weathering, and the roles of solution chemistry, Eh, pH, small particles, and colloids in surficial reorganization of elements into secondary phases.

Chapters Two and Three comprise up-to-date discussions of methodologies of regional geochemical mapping and laboratory analytical methods.

Four chapters deal further with principles of chemical reactions in soil (with emphasis on trace metals) and water, and with the interactions of soil with waterborne elements, microbes, plants, animals, and humans. The chapter on water quality includes a discussion of the effects of such chemical treatments as chlorination, softening, and pH adjustment, that are commonly done on natural waters before they are distributed for human consumption. Such treatments may remove naturally-occurring trace elements or add other elements.

The remainder of the book is devoted to applications of geochemistry. The roles of numerous essential macro- and micronutrients and trace elements in human, animal, and plant development and health are still incompletely understood. Interactions between elements are often complex: one may inhibit the body's ability to use another. Many elements seem to be essential in small amounts, show a broad range of physiological responses in moderate amounts, and are potentially toxic in large amounts.

Especially in the industrialized nations, metals pollution of soil, air, and water is now a major concern. Three chapters deal with sources of metal pollution, biogeochemical pathways, models to predict speciation patterns of metals in natural media, and assessment of pollution. These chapters are likely to be of special interest to Californians. The final chapters deal with effects of pollutants from coal development, and with natural environmental radioactivity.

The book's comprehensive treatment and extensive references lists will be useful. Regional discussions and many, though by no means all, examples are drawn from or directed towards the United Kingdom, but the information is broadly applicable....*Gail Wiggett.*

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